

In both P. priscus + P. mitchelli, nine additional specimens of humeri (the type element) are represented. all resemble *Procarrariidae*

Sharktooth Hill

The species *Puffinus priscus* and *Puffinus mitchelli* ~~xxxxxxxxxx~~ resemble living *P. p. uffinu* ~~xxxxxxxxxx~~ and *P. griseus* in the blade-like flattening of the shaft. *P. priscus* is the smaller of the two and in many measurements closely approximates *P. p. opisthomelas*. *P. mitchelli*, on the other hand, agrees more closely in size with the living *P. griseus*. It has not been too difficult to assign additional elements to these two species. is less easily identified

*Puffinus inceptor*, however, does not resemble any of the living species

The single, holotype, specimen of *P. inceptor* ~~xxxxxxxxxxxxxx~~ ~~xxxxxxxxxxxxxx~~ is more distinctive and it has been difficult to determine possible assignments for additional material

*Puffinus priscus* Miller including two nearly complete specimens, Nine additional humeri can now be assigned to this species:

total 15 specimens of P. priscus 7 complete type 8 needed material

- ✓ Complete left, LACM 18140, from loc. 6688; length 82.5 mm (7.4 mm in holotype), proximal breadth 15.1 mm, distal breadth across condyles 7.3 mm, height of ectepicondylar from distal end 10.0 mm.
- ✓ Nearly complete left no. LACM 44658 from loc. 1625. Length 80.3 mm, breadth across condyles 7.2 mm.
- ✓ Left distal end no. 103325 from loc. 1622. Breadth across condyles 7.5 mm, ht ectepicondylar prom. 10.0
- ✓ Left distal fragment no. LACM 16469 from loc. 1625. Breadth across condyles 7.1 mm, height ectepicondylar prominence 9.8?
- ✓ Beak proximal end no. LACM 98475 from loc. 3160. Proximal breadth 14.6 mm (similar measurement in *P. p. opisthomelas* 14.4 mm)
- ✓ Associated proximal and distal ends of right no. LACM 17502 124688 Proximal breadth 15.3 mm, ~~xxxxxxxxxxxxxxxxxxxx~~ breadth across condyles 7.3 mm
- ✓ Right shaft only. Depth of shaft near distal end 6.3 mm (6.2 mm. in holotype)
- ✓ Proximal end of left ulna no. LACM 17503 from loc. 6688. Proximal breadth 6.5, depth 7.9 mm )*P. p. opisthomelas* 6.9 and 8.7)
- ✓ Incomplete distal end of tarsometatarsus (right, no. LACM 104058 from loc. 1622. Shaft breadth above trochlea 3.8 (3.5 in *P. p. opisthomelas*, 4.8 in *P. griseus*)

marked 1 added persons 13 (11 marked)

Two humeri 9

Rechecked 4/19/66

Loc 1657 10925 10476 needed Loc 1625

- ✓ Prox humerus Loc 4956 7-B-24 uncataloged
- ✓ Synsacrum 51659 Loc 4689 ?

Compare char. of each element with humeri, esp. prox. humeri

check *Puffinus californicus* (Loc 1945) and *P. bairdi* (Loc 6904) nigra

- ✓ Dist left humerus 53926 Loc 1622 Condyle 7.4 - ht ectep 5.9



of proxellariiforms

Only six additional specimens have been recorded subsequently:

*Diomedea californica* Miller;

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

A second tarsometatarsus (distal end) LACM 18203 (Howard 1978:6)

Distal end of humerus LACM 16468; and questionably assigned,

badly eroded distal end of femur LACM 7431XXXXXXXHoward 1966:2

*Puffinus priscus* Miller: Distal end of <sup>right</sup> humerus LACM 16469, and

two humeral shafts, LACM 16476 and 16475 (Howard 1966:4).



Sharktooth Hill Procellariiformes *Puffinus cornutus*

2 needs  
water  
1930-  
where  
is it

4 recorded  
9 added  
13 total OK

best under spec ✓

list under  
Prof. Str

1 new  
15 add  

---

16 OK

Paffius

Over



# Puffinus sp. and Puffinus (?)

Listed with ~~incomplete tarsometatarsus 104058 (Lor 1622)~~  
probably, too large for juv

held with ~~not coracoid lacking~~ juv 17506 (Lor 1625)

~~on left with multiple interlocks~~ ? Left tarsus 98476 (Lor 3160) may not be Puffinus

One dist frag tarsometatarsus 30819 (Lor 3161) Puffinus?

P. sp.  
6 or

Dist humerus 97525 (3162) can't find specimen  
prox. left humerus ~~4956~~ 59706 sq. 7-8.24 = narrower shaft  
Coracoid 98473 (3162) dist frag specimen

Dist humerus Kuhlman 9-1-2 can't find specimen

~~interlock not distal~~ ? Prox & dist ends at humerus 50706 (Lor 3160) br 13.0, condyles 5.8  
Lor 3230 prox end at ulna br 8.2, dist 9.5

Y almarus new sp?

Complete left humerus Howell Thomas Lor 3162

length 48.6 prox 13.5 dist 9.6, Condyle 70  
entepicondylar prom. lat 7.9 (very low)

~~Lor 4956 1982~~

~~Shackelford also Puffinus-like~~  
Oct 14, 1982



## Shanktooth Hill

## Puffins or Fulmarus

Puffinus maculosa Wilson

Holotype dist humerus (right) Col de la Seiz #5223 (Racine, 4345)

Mitchell? Ulna (distal end left) lor. 1655 #18697 Puffinus sp.

Size seems closer to guineus, hence this

may belong to Puffinus mitchelli

gr. h. 8.8, depth 6.35 (guineus #50 8.4 x 7.31, guineus #60 = 8.2 x 7.4)

Mitchell?

ulna (distal end right) lor. 1688 #17504 Puffinus sp.

Size slightly smaller than the above, but

still seems too large for P. praeceus

gr. h. 8.4, depth 6.25 (guineus #55 = 7.2 x 6.0)

guineus #60 = 8.5 x 7.5

1229937, Sp. Humerus (nearly complete but poorly preserved) lor. 3162

unnumbered Howell Thomas

#122995

Appears to be small Fulmarus, Note

particularly prominent point of crest

and low ectepicondylar prominence

and shaft not blade-like at distal end

4956

✓

Humerus (incomplete but including proximal end) from lor. 4956

unnumbered by field # Sg 7-8-29

Suggests Puffinus but shaft is less blade-like

than in P. praeceus &amp; P. mitchelli

Prox breadth 15.1

distal end too narrow for mitchelli?

and not condyle

less distinctly median

Prox crest not sharp (bicipital)

and seems more rounded

than in Puffinus

Humerus

(complete)

Kirchland 914 unnumbered

right length 83.8, to prox 15.1, to condyles 8.1

diagonal breadth dist end 11.6

Int ectepicondylar from 10.1

Very short bicipital crest

Possibly = Puffinus maculosa

Humerus

(distal end)

Small size suggests P. praeceus

but shaft seems less blade-like (may be due to poor preservation) Prox condyles 7.2

Tarsometatarsus (incomplete distal end, right) lor. 1622 #104058

Puffinus sp.

Size could be

either mitchelli or praeceus

incomplete, to decide shaft breadth

now listed

under P. praeceus

guineus 2.5, guineus 2.8

just above trochlea 3.8

guineus 3.5, guineus 4.8

probably

praeceus



Note P. priscus humerus size = P. just humerus  
P. mitchelli humerus size = P. just humerus

Shank bone = Heel Bone Pracellariformis (Di. condyle P. priscus 7.5 } P. humeri Type  
" " P. mitchelli 8.5 }  
" " P. angust 10.0 }  
" " " 7, 1982 }

Shearwater genus Puffinus 39 bones (but 2 questioned)

Not here 10.7.82 Loc. 155 ✓ P. ? incerta prox humerus 6972 recorded

10.7.82 ✓ P. priscus humerus shafts 16475

not clear check P. barnesi → Loc. 1622 ✓ Dist. left 53926 humerus <sup>diag</sup> gr. dist br. 10.2, br condyles 7.8, ht ectepi condylan process 8.7

✓ P. priscus ?  
✗ Dist right humerus 53927 <sup>diag</sup> gr. dist br. 13.1, br condyles 9.2, ht ectepi condylan process 11.7  
P. mitchelli ?

✗ mitchelli

✗ 2 priscus ✓ II 103325 left dist humerus, gr diag breadth 10.3, br condyles 7.4, ht ectepi process 10.8  
P. priscus

✗ priscus

later unknown ? # 104058 right dist end tarsometatarsus incomplete approx. br 8mm, depth int. trabecles 4.2, 2.5 x 3.2 br to depth shaft (middle?)  
probably too large for priscus (Too slim for P. mitchelli from Baya)

reads study genus ? ✓ Loc 1625 ✓ 17506 - right coracoid & scapula humerus (ant) 17505 - right prox ulna br 8.5, depth 8.8 (prox end) (see Howells Thoms 3162 unnumbered wire)  
P. mitchelli

✗ very good mitchelli Complete humerus mitchelli ✗ ★ 17500 - right and left complete humeri P. mitchelli <sup>ht</sup> gr. length 98.3, br dist 12.5, br condyles 8.5, ht ectepi proc. 11.5, prox br. 17.7 (complete)  
P. mitchelli

✗ priscus only complete humerus priscus ✓ ★ 44658 - right complete left humerus (except internal side missing prox end) length 80.3, dist br (diag) 11, br condyles 7.2  
P. priscus

✓ 16469 dist frag left humerus br condyles 7.1, ht prox 9.8? P. priscus

✓ 16476 shaft of right humerus depth shaft near dist end 6.3 Size suggests P. priscus

✗ mitchelli Loc. 1455 # 98869 left dist humerus incomplete - cannot measure precisely but compared to 4y reg P. mitchelli (w- & priscus) seems ok for P. mitchelli

✗ probably mitchelli ✗ 98868 - shaft of humerus depth suggests P. mitchelli

✗ priscus check NOT priscus ? ✓ 18697 Dist. left ulna. Size suggests P. mitchelli

✓ 98475 prox left humerus, br. 14.8. Size suggests P. priscus

✗ 38756 cranium gr br. 25.7 - Size suggests P. mitchelli

✓ 98476 left tarsometatarsus 50706 right prox and dist ends humerus dist diag br. 13.0, br condyles 8.8 requires study!!



N. sp.?  
No 5  
Puffin  
Ty Fulmar  
Loc 3162 Howell Thomas complete left humerus length 78.2, A. prox 13.5  
gr. br. dist 9.6, br. condyles 2.0, ht. end of prox. 7.9 (very low)  
sh. above dist end 5.2 x 3.2 (br x depth)

~~dist. end~~  
~~mitcheilli~~  
Prox end left ~~humerus~~ <sup>to dist</sup> - size suggests P. mitcheilli  
prox br. 6.8 mm

~~dist. end~~  
~~mitcheilli~~  
Dist end left ~~humerus~~ br 6.3, mit depth 6.8. size <sup>between</sup> ~~mitcheilli~~  
That expected for P. pusillus and that expected for P. mitcheilli.

mitcheilli X Prox end right ulna br 8, depth 9.1 size suggests P. mitcheilli  
(see #17505 from loc. 1625)

X mitcheilli mitcheilli X Prox right humerus prox br. 16.7 size suggests  
P. mitcheilli  
(see #17500 from loc. 1625)

Puffinus? 31617, #3819 dist. (vic. with uln. shaft) <sup>right</sup> ~~apophysis~~

X mitcheilli 3162 X #57184 2/3 humerus left br. condyles 8.3 P. mitcheilli?  
see also complete humerus 17500/02/1625 + 2 more?

not here Loc 31627, #97525 dist humerus ?

not here Loc 3162? 98473 coracoid ?

sp? here 4173 dist ulna (right) size suggests P. pusillus gr br 7.8 (diag.)  
✓ #117719

X mitcheilli Loc 4956 X Left humerus lacking head 10-B-31 Try P. mitcheilli  
X P. pusillus? ✓ Prox end humerus 7-1324 small prox breadth 15.1? (shaft + part of distal end still in matrix)  
Loc 6688 ✓ #51659 synsacrum length 52 probably P. pusillus (size close to opisthomerus)

pusillus ✓ 17503 prox left ulna size suggests P. pusillus br 8.5, depth 8.0 94.1%  
sp? X 17504 dist. end right ulna gr br 8.6 P. mitcheilli? (see 117719 Loc 4173 above - larger)

X P. pusillus ✓ 17502 prox + dist ends of right humerus prox br. 15.3, dist. br. 11.1, condyles 7.3 P. pusillus

X P. pusillus ✓ 18140 complete left humerus, length 82.2, prox br. 15.1+,  
dist br. (diag) 11.5, condyles 6.9, ht. end of prox. 10.0  
P. pusillus (see #44658 loc 1625)  
+ 1 more

check for ~~mitcheilli~~?  
except  
Kukland 9-I-4

humerus right length 84.1, br. dist, diag 11.6+, condyles 8.2, <sup>ht</sup> 10.1, end of prox. 14.5, sh 5.7 x 3.4 ~~dist~~ dist half, 4.0 x 5.4 <sup>prop</sup>

not here? 9-1-2 - dist humerus

Loc 3230 prox end of ulna 8.2 br, 9.5 depth



Ma Goose like in <sup>Hanover</sup> first olecranon (but tiny ducks). Swan bones in water not as  
as does Phoeniculus & scapula. Presbycus. Osteodontois & mo

Shakhsath Hill Presby Chen, Osteodontomus & Megafalacalcha

1557 *Predigian* <sup>new left gen.</sup> *manu* <sup>br. 18.3</sup> (14466) <sup>no</sup>  
 1625 = *Tubi* <sup>3453</sup> *tauroneatus*  
 1625 = *Pear* (right?) <sup>24483</sup> *anemine* <sup>br. 21.5, condyle 14.7</sup>

[illegible]

AT 3162 → Dist end left humerus (right) Presbycus? gr. B. 31.7 mic.  
P. prox end humerus (right) Presbycus? prox h. 18.6, lead

25 - Dist end left humerus Pristychus? sp. B. 31.7 mic.  
62 - Dist end left humerus (18.6) Pristychus? sp. B. 31.7 mic.  
• 31.2 Prox end humerus (18.6) Pristychus prox h. 18.6, least h. sh 6.8 (m. dist end)  
Dist end ulna

7. *Prætychium*? (CAST & UCM Specimen) 50620 distend ulna  
 bc trochlea only 71.6, depth ext. 14.6  
 max end aa in *Chendylor*

~~Trachylem~~: (C) ~~or~~ Trachylem only 1.5, 2.5  
 6658  
 ext side curving in from prox and aa in chondyle  
 3-E-216  
 4-E-216

side curving in from prox and aa in Chenopod  
 Presbychus complete fibrous 3-E-21 (ext H 15.5, brd H 15  
 2.5 decuss 3-H.17 (ext H 8.2, prox 20.5  
 17-28 1-93050

right femur 3-11-28  
left femur 10-12-28

" " " left fuel  
" " " UCMR Sumner 930-70 5'00.19 ✓ V1101

crushed shafts mean radius 985.97 Kitchland  
in condenser 39.5" # 50660 (43.0) (33.7)  
41.5" (41.5?)

duct. humerale  
pro ulnae  
br 40.5  
lao ment - 46.2  
5g - 1 - I in catalogue  
5-H-14

sex? Immature fragment  
 very posterior not seen (black) about 20 mm distal  
 post end pedal digit H 48900 In prev. 12.2  
 adding to Olson in "Arctic" - rostrum 1.0  
 (left depth 21.9)

leaf + petiole (leaf date 21.7.77)  
7.0 cm x 9.878 cm in length 17.55.5, b.

L<sup>1</sup> 4672 Stork distal end + tarsometatarsus (L<sup>1</sup> 4672)  
 L<sup>1</sup> 1625 Megapalaeodactylus right claw 98782 including 1755, br. head 1755  
 distal end left + tarsometatarsus (L<sup>1</sup> 1625) UCM 1625

6688 *Megafalobolus* dist end left tarsometatarsus (C+5) 13 only 15.4  
 50621 - Br. ~~metatarsal~~ trochlear 20 Br. troch 8.6 m dist end  
 1/6/68/88345

4688 *dist. undulata* 50620 0 cmpr V6843/88345  
1622 *Pteryx ulna* 104081 K. ulnaid ~~flamiger~~? Ciconiidae

4488 chest and ulna 5620 0 cm. 104081 K. ulna ~~flamingo~~? Ciconiidae  
 1622 Prox ulna 104081 K. ulna

dental ulna ~~from~~ <sup>VCMF</sup> 88345 - *Pterodroma* <sup>etc</sup> *reginaldoides*? <sup>to 21.9</sup>  
= *racm* 50620? <sup>LYP = VCMF 32267</sup>

Barbus virens  
of Mysal. <sup>55</sup>  
lacustris  
en virens

Alden's Megalopalaeodus connecteur type UCM P37367  
 holotype dist end. of tarso. measures 2.7 mm. from So. Dakota  
 "gr. width across trochlear (not at its angle) low, minute  
 (shape) 2.7 mm. Shape not present

depth of track. 2 yb. 0; depth of track. 3 - 15.7 mm  
5 depth track. 4 - 14.3 mm. 9

4.3 mm.  
? aquatic (woodland) area?  
streams, lakes, river.  
Mid. So. Dakota

25 169  
 104051  
 4672  
 5930A-F  
 C. com. in 1822  
 prior ulna  
 dist. tub.



UCMP: ~~2003~~ 2303 from Barton Museum

(17.5  
21.9

dirt tube from Shachtsh-Nile 4672  
locality 4672 unnumbered

STHll

No notch in striae as in the bone from STAIN

| Depth | Species     | 13.3 | 18.4 | 19.2 | 15.0 |
|-------|-------------|------|------|------|------|
| 425   | Trigloporus | 13.3 | 18.4 | 19.2 | 15.0 |
| 709   | "           | 13.3 | 17.2 | 19.2 | 15.0 |
| 1680  | "           | 12.4 | 16.6 | 19.2 | 15.0 |
| 1334  | Ciconia     | 14.9 | 19.2 | 19.2 | 15.0 |
| 1504  | "           | 14.8 | 17.3 | 19.2 | 15.0 |
| 242   | "           | 17.2 | 21.0 | 19.2 | 15.0 |
| 1000  | Fossil      | 17.5 | 18.0 | 19.2 | 15.0 |

Lord